



Catastrophic Failure Plan
South Sioux City, NE

Purpose:

To identify process critical equipment and addresses the mechanical failures associated that have the potential to impact facility biogas product and compliance with Wastewater Discharge Permit #2016-31-1. The catastrophic equipment failure assessment was done for the major system units and their components that potentially have a direct impact on the compliance of the wastewater discharging to the Sioux City Wastewater Treatment Plant (WWTP).

Summary:

- Failure of the valves and piping are not considered critical as they can be easily replaced with off the shelf and readily available materials.
- A chronic failure of a vessel or tank was also not considered due to the very low probability of such an event occurring and these represent a failure that can be addressed before impacting the biogas process or effluent wastewater compliance.
- Failure of the Gas Energy Mixing (GEM), centrifuges and system pumps could be catastrophic as the efficiency of the treatment process would diminish until the unit is repaired and/or replaced. The following table presents Big Ox's commitment to repair or replace critical equipment should they fail and a rough estimate of the lead time required for those efforts:

Critical Equipment	Failure Points	Operational Consequences	Contingency	Estimated Repair/Replacement Period
Centrifuge(s)	Motor	Only able to process half of the sludge generated	PM system in place.	24 hour when motor is on hand. 3-4 days otherwise
	Complete Unit Failure			30-60 days *currently quoting a third unit
	Air Saturation Blower			
	Solids Removal Skimmer			
GEM	Skimmer Chain	Inefficient solids removal and pass through to the City	PM system in place for all GEM components	One week parts repair if repair month lead time on replacement
	GEM Feed Pumps			
	GEM Recirculation Pump			
	Complete Unit Failure			
Cationic Polymer Feed Units	Chemical Feed Pump	Inadequate Coagulation and inefficient solids removal from the GEM and pass through to the City	A standby feed pump is kept in stock allowing for a quick response	Onsite maintenance team will have unit operational within hours provided replacement equipment is on hand or in stock
Anionic Polymer Feed Units				

Effluent Wet Well Pumps	Unit Failure	Longer pump cycles on one unit leading to motor stress	Two units are in place for redundancy	Three week replacement period
-------------------------	--------------	--	---------------------------------------	-------------------------------

Notification:

BOE will notify the WWTP prior to making any changes to the plant operation that could impact the volume, concentration, or nature of the wastewater being generate and discharged from BOE. BOE will notify the WWTP following any of the above identified "Critical Equipment" with a summary of the impacted impact on the wastewater being generated and discharged from BOE. The notification shall include a plan of action for the repair and/or replacement of the critical equipment. A follow up email shall be sent to the WWTP once the repair and/or replacement are completed. If necessary, additional samples may be collected to aide in the alternative process modifications that can be made to reduce the pollutant concentrations discharging during an equipment failure.

Desiree McCaslen

Desiree McCaslen, Director of Regulatory Compliance

8/30/17

Date